

WHENCE THE ENCHANTED BOUNDARY? SOURCES AND SIGNIFICANCE OF THE PARAPSYCHOLOGICAL TRADITION

By BRIAN MACKENZIE AND S. LYNNE MACKENZIE

ABSTRACT: Intellectual resistance to parapsychology cannot be understood as simple prejudice, or as normal resistance by scientists to new and counter-intuitive findings, or even as normal resistance to findings that conflict with current scientific theories. The resistance stems instead from the incompatibility of paranormal phenomena with the assumptions underlying the development of modern science since the seventeenth century. These assumptions constitute a loose but unvarying *a priori* framework for the interpretation of nature within the natural sciences; paranormal phenomena can be defined as all those which are rendered impossible by acceptance of this framework. The significance of these assumptions for physics and psychology has been discussed by historians and philosophers of the natural sciences such as E. A. Burtt and A. Koyré, but their even greater import for parapsychology has not previously been analyzed in detail. Analysis of these assumptions clarifies the status of the Basic Limiting Principles advanced by C. D. Broad in his descriptive account of the meaning of the paranormal. It also provides grounds for doubt about the likelihood of further assimilation of parapsychology into the ranks of experimental sciences.

Parapsychology has always had a hard time at the hands of critics. Common criticisms have included such matters as non-

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While this paper was being typed, the authors received word of the sad loss to parapsychology occasioned by the death of Dr. J. B. Rhine. Dr. Rhine and the senior author had extended conversations on historical and philosophical topics late in 1977. In these conversations, Dr. Rhine brought his unparalleled experience and sophistication in parapsychology to bear on many of the issues discussed in this paper. Although Dr. Rhine could not have been expected to agree with all the points made here, the paper owes much to his influence. The authors wish respectfully to dedicate it to his memory.

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The Mackenzies are members of the Department of Psychology at the University of Tasmania.—Eds.)

replicability, inadequate experimental design, and inappropriate statistical analysis, but have also frequently focussed on the unscientific nature of parapsychology, the a priori impossibility of the paranormal, and the likelihood of systematic fraud (for reviews see Pope & Pratt, 1942; Ransom, 1971). In reacting to such criticisms, parapsychologists often complain that their critics do not play fair, that they are unduly harsh and intolerant and carry skepticism to the point of irrationality. Prince's *The Enchanted Boundary* (1930/1975) is a well-known collection of nineteenth- and early twentieth-century instances in which critics, once they step over the enchanted boundary separating parapsychology from ordinary science, lose much of their impartiality, fairness, and critical reasoning ability. Similar complaints in a more modern vein are made by Nilsson (1975), Martin (1979), and many others.

Whether or not critics lose their critical acumen when they confront parapsychology, many indeed do seem hostile and convinced of the impossibility of paranormal phenomena from the outset. Why should they take this attitude? Parapsychologists often suggest that it is sheer prejudice against new and counter-intuitive findings that makes critics so unwilling to accept the evidence for paranormal phenomena. Indeed, this view gains some support from Hebb (1951):

Personally, I do not accept ESP for a moment, because it does not make sense. My external criteria, both of physics and physiology, say that ESP is not a fact despite the behavioral evidence that has been reported. I cannot see what other basis my colleagues have for rejecting it; and if they are using my basis, they and I are allowing psychological evidence to be passed on by physical and physiological sensors. Rhine may still turn out to be right, improbable as I think that is, and my own rejection of his views is—in a literal sense—prejudice. (Hebb, 1951, p. 45)

Not all scientific scoffers, however, would be prepared to join Hebb in his confession, feeling confident that they, at least, were fully justified in their hostility. Besides, prejudice is not an explanation for such hostility. It is at best a way of classifying it, although a way from which parapsychologists may draw some slight comfort. The question remains, but now in more emotive language: Why should so many scientific nonparapsychologists be prejudiced against the field? In fact, it may eventually be more important to turn the question around, and ask, why are some people not prejudiced against it?

The initial purpose of this paper is to trace the source of this hostility to some of the assumptions underlying the Western attitudes toward science and rationality since the seventeenth century. In making the analysis we will try to show that scientific and intellectual resistance to parapsychology is not merely a result of ad hoc prejudice, but is the precise complement to, the other side of the coin of, the modern interest in the field. Tracing the basis for hostility will therefore throw some light on the more positive question of what makes an event or phenomenon paranormal. We will try to show that the modern concept of the paranormal is a culturally specific one and can only be clarified historically.

ANCIENT AND MODERN STRICTURES AGAINST THE PARANORMAL

Paranormal events are, to say the least, unusual and difficult to regulate, whether they ever really occur or not. They have always been taken to constitute a possible threat to the laws of man, God, or science, and have accordingly excited a fair share of suspicion, whether political, theological, or intellectual, throughout history. When modern parapsychologists complain of their critics' excessive suspicion and intolerance, what they are complaining about has connections with the suspicion and intolerance directed from time to time toward students and practitioners of astrology, oracles, sorcery, and other forms of divination and magic in the ancient world. There are also major differences between the modern and the ancient forms of suspicion, and these correspond very closely with the differences between the modern and the ancient ways of using and studying the paranormal.

On at least eight occasions between 139 B.C. and A.D. 175 astrologers were banned from Rome and, in all but one case, from all of Italy (Cramer, 1954). In every case, the ban was prompted by rebellion, unrest, or suspected plots against the government. The justification was simple. Astrology was "considered as the most nearly infallible method of divination" (Cramer, 1954, p. 233), or in modern terms the most reliable technique of precognition, and as such could provide dangerous information to enemies of the state. For the same reason, casting the emperor's horoscope or consulting auguries or oracles about matters of state was a capital offense under the treason laws (Cramer, 1954, p. 249). Obtaining knowledge about the future by precognitive means was a politically

dangerous undertaking, precisely because the procedures for doing so were accepted as reliable and valid.

The later Christian emperors Constantius (in A.D. 356) and Valentinian (in A.D. 370–373) tried to enforce a permanent ban on astrology and most other forms of divination throughout the empire. These bans had a theological rather than a narrowly political motivation, and were part of the Draconian restrictions enforced generally on pagans and Jews at the time (Cochrane, 1957). The justification in these cases was thus not that divination was either ineffective or likely to fall into the wrong hands, but that it was blasphemous.

Later theological attitudes to the paranormal, when it was not being overtly suppressed, are nicely illustrated in a sixteenth-century poltergeist case described by Gauld and Cornell (1979, pp. 23–26). The focus of the disturbances, which were mainly rappings, was an eighteen-year-old nun in an abbey in Lyons. The putative source was the spirit of another nun, who had absconded with some of the abbey's relics, died wretchedly, and was suffering miserably in Purgatory for her sins. The bishop of Lyons assigned a preacher to investigate. His actions centered on communicating with the spirit through raps, and on organizing prayers, services, etc., to release both the spirit and the living nuns from their torments. In this he was successful, and in the final communication the spirit indicated that her sentence in Purgatory had been commuted from 33 years to 33 days. The point is that while the rappings were considered to have an otherworldly source, their genuineness was not a cause for concern; putting an end to them, through theological intervention, was. The preacher was "less concerned about the genuineness of the phenomena (which he takes for granted) than about the ecclesiastical ceremonies which he arranged in consequence of them" (Gauld & Cornell, 1979, p. 26). For modern readers, the prayers and masses might have put an end to the phenomena because of their effects on the expectations of the suggestible participants; but for those participants the need for ecclesiastical ceremonies arose precisely because the phenomena were accepted at face value.

Finally, the European "witch craze" of the sixteenth and seventeenth centuries has been accounted for in a number of ways—economic exploitation, religious conflict, etc. (e.g., Trevor-Roper, 1970). It is at least clear, however, that the beliefs of those involved, witches and witch finders alike, were often sincerely held, whatever their origins. Witches were ruthlessly persecuted,

not because of the absurdity and impiety of their claims to have special powers, but quite the contrary: because it was widely believed that the witches really did have strange and mysterious powers, obtained by evil means and used for evil ends.

In each of these four cases the supposed paranormal phenomena provoked concern, suspicion, and actions intended to restrict or eliminate them. The actions were based on the political or theological implications of the phenomena. The theological actions in particular were often accompanied by moral repugnance for the phenomena and fervent enthusiasm for their abolition, but these strong emotions were always predicated on the assumption that the phenomena were real. Otherwise, what would there be to get so excited about?¹

By contrast, when a late nineteenth-century professor of psychological medicine recommended that spiritualist mediums be hospitalized and given strong purges to cure them of their "mediomania" (Marvin, 1874), or when a modern physicist urged that all those who teach the validity of pseudosciences like astrology and parapsychology to their impressionable students be horsewhipped, fired, and blacklisted (Condon, 1969), they were not basing their opposition on the evil results of genuinely paranormal events. Instead, they were concerned about the evil results of believing in such affronts to reason as spiritualism and parapsychology provide. In the one case, the poor wretches who thought that they could communicate with spirits had to be cured of their delusion.² In the other, the immoral people who were engaging in such "corruption of children's minds" had to be punished and prevented from ever doing it again.

The moral indignation, the perception of the paranormal as a threat to the established order, are as clearly present in these

¹ In the "dark ages," as Trevor-Roper (1970) points out, there was no "witch craze," as belief in witches was discouraged by both church and temporal authorities. While most of the discouragements were mild, the one example of severe sanctions in connection with witchcraft that Trevor-Roper cites for this period is that of Charlemagne, who "decreed the death penalty for anyone who, in newly converted Saxony, burnt supposed witches. Such burning, he said, was 'a pagan custom.'" (Trevor-Roper, 1970, p. 122)

² It was, however, the spirits rather than the phenomena which most excited Marvin's hostility:

Setting aside two-thirds of the phenomena, which are, beyond all doubt, the results of superstition or fraud, there remain a few phenomena which actually occur and are more or less wonderful; but there is nothing in their nature which indicates the presence of a disembodied spirit, and there are many things which make it evident that no such spirit

examples as in the actions to suppress astrology and witchcraft. What has changed is the focus of the attack. Spiritualism is dangerous, not because it puts the soul in thrall to the unseen powers beyond, but because it leads to weakening of the nervous constitution. The effect, admittedly, is much the same. Teaching parapsychology as an established science is immoral, not because it shows how to obtain information which could be used to the detriment of the state, but because it diverts attention away from reality and reality-based action and toward wish-fulfilling fantasies. Again, the effect is much the same. But the change in the focus of the attack is significant. In the modern examples it is the validity of the claims made by spiritualists and parapsychologists that is denied, the truth of their positions, the factual existence of spirits and extrasensory perception. The claim is not that these things are evil, dangerous, etc., in themselves, but that they do not exist, and that as a result belief in them is evil or dangerous. The fundamental question and basis for opposition is no longer goodness and order, but truth.

It is perfectly conceivable that this change could simply be a change in idiom, with the underlying basis for opposition to the paranormal unchanged since classical times. In an age of scientific authority and moral relativism it is far more damning for a belief to be labeled false than evil. If the basis for opposition were unchanged, however, it would be necessary for the established order challenged by the paranormal to continue to be mainly political and moral/theological, rather than, say, intellectual. The positions of Marvin and Condon would indeed permit such an interpretation, but many others would not. For most critics as well as for most parapsychologists, the fundamental question is indeed one of fact, of the existence of paranormal phenomena; and the

has anything to do with them. . . . Let it be admitted that the operator is honest, and that the table moves without actual contact with his person, is that conclusive evidence that the table is removed from his intellectual control? It is far more rational to believe that the brain of a living man, of whose existence I have proof, exerts an influence which moves the table, than that the invisible and imponderable brain of a spirit, of whose existence I have no proof, moves the same article of furniture. What do I gain by discarding the improbable for the impossible? (Marvin, 1874, pp. 19-20)

Marvin rested his confidence on William Carpenter's theory of "unconscious cerebration" to explain the intelligence manifested in spiritualist phenomena ("Many of the noblest achievements of art, literature, music, and science are the direct results of unconscious cerebration. In fact the largest part of the routine of life is carried on unconsciously."—pp. 20-21), and recommended that we "quietly wait the development of science" (p. 16) to explain the physical effects.

fundamental implications that these phenomena would have, if accepted, are for scientific systems and for the view of the world as a causally ordered sequence, on which these systems depend.

The basis for the modern intolerance of the paranormal is more clearly expressed in an article by Price (1955). In this article, Price argued that to rebut any experiments that claimed to have demonstrated ESP, all that is necessary is to show how the design and procedure of the experiment could have permitted fraud. The fraud could come into any stage of the experiment—the running, scoring, data analysis, or writing up—and could involve as many people as necessary, including the subject, the experimenter, and any witnesses. There is no need to show that fraud actually occurred; if it can be shown that fraud could have taken place, then the scientist has a clear duty to consider the experimental results worthless as evidence for the paranormal. Price went on to propose some far-fetched means by which some of S. G. Soal's telepathy data could have been faked, without suggesting the far simpler way in which, it later appeared, they actually had been faked (Markwick, 1978).

Price's suggestion of fraud was taken up by later critics of parapsychology (Hansel, 1966; Gibson, 1979). Defenders of parapsychology, on the other hand, denounced Price's argument and similar ones as scurrilous attacks on the probity of honest researchers (Soal, 1956), as legislating against the possibility of any scientific revolutions (Martin, 1979), etc. Price's article has, indeed, been a *bête noir* among parapsychologists for 25 years, and has been taken to typify all that is unreasonable, unfair, and prejudiced in the attitude of critics.

By contrast, we view Price's article as a very moderate and reasonable statement of why parapsychology is an affront to the intellect of people committed to a scientific conception of nature, and therefore of why the field has attracted and must continue to attract scientific odium.

What could lead Price to take such an extreme position as to make a blanket suggestion of fraud against parapsychologists? Early in his article, Price endorsed Hume's argument against miracles, which, he said, disabused him of his own earlier belief in ESP: "A miracle is a violation of the laws of nature; and as a firm and unalterable experience has established these laws, the proof against a miracle, from the very nature of the fact, is as entire as any argument from experience can possibly be imagined" (Hume, 1748/1962, p. 119). The same reasoning is put more pithily in a

rhetoical question which Price quoted from Thomas Paine: "Is it more probable that nature should go out of her course, or that a man should tell a lie?" (Paine, quoted in Price, 1955, p. 360). Hume's and Paine's arguments have an appealing simplicity to them. But the rebuttal to them (made explicit in reply to Price by Meehl & Scriven, 1956) is obvious. They are only valid arguments against the paranormal if we already know all the "laws of nature." Since we do not, the rebuttal goes, it is rank intellectual arrogance, provincialism, prejudice, etc., to dismiss evidence for the paranormal on the basis of such reasoning. The obvious logical validity of this rebuttal has, however, had little effect. There are few recorded instances of critics snapping their fingers in vexation, saying, "Of course, we don't know all the laws of nature! Why didn't I think of that?" and changing their attitudes to parapsychology accordingly. There is clearly more behind Price's analysis (and its later endorsement by Hansel and Gibson) than a momentary forgetting of the incompleteness of our knowledge.

Price went on to give a more detailed contrast of the difference between a scientific and what he called a magical attitude to nature:

A scientist sits in his living room and says: "Table, rise." His speech pattern is portrayed on the screen of a visible speech apparatus. Phototubes observe the pattern through masks of appropriate shapes. A switch is closed, turning on an enormous electromagnet on the floor above. This attracts an iron plate concealed within the table top, and the table rises to the ceiling.

Similarly, the magician says: "Table, rise." And the table rises. The difference is that there is no iron plate, no electromagnet, no switch, and no speech interpretation apparatus.

Now a scientist can accept the absence of the iron plate; it is conceivable that there can exist sharply localized forces attracting wooden objects. He can even accept the absence of the magnet. What he cannot accept is the absence of the speech interpretation apparatus and the switch. New forces can be fitted into a scientific scheme of things. What cannot be made to fit is the *intelligent* manner in which the force is turned on and *directed* to act upon the table.

In the scientific process, each successive detail is provided for. In the magic process, there are just the wish and the result, and all intermediate steps are omitted. The essential characteristic of magic is that phenomena occur that can most easily be explained in terms of action by invisible intelligent beings. The essence of science is mechanism. The essence of magic is animism. . . .

Suppose that some extraordinary new phenomenon is reported: should we be narrow-minded or receptive: the test is to attempt to imagine a detailed mechanistic explanation. Whenever we can imagine any sort of detailed explanation without introducing incorporeal intelligences, we should be prepared to regard the phenomenon open-

mindedly. For this test it is not necessary that our explanation be simple, reasonable, or usable in making predictions. For example, any nuclear physicist could postulate a score of new forces, transition rules, and such, and so produce a complete theory of the atomic nucleus. Such a theory would be scientifically worthless, yet it would still satisfy the proposed test. (Price, 1955, p. 361)

The key elements here are possible mechanistic explanations on the one hand, and incorporeal intelligences on the other. It makes no difference if the "invisible intelligent beings" are not the discarnate spirits Price implies but facets of the subject's own mind that can act independent of muscles and sensory receptors. By acting in such a way they rule out mechanistic explanations just as much as if they were jinn released from a lamp (another of Price's examples). And insofar as science is a search for mechanistic explanations any such phenomenon is thereby removed from the possible world of science; the mechanism of scientific theories is, to be sure, more cloudy than it was a century ago, but the broadening of concepts of mechanism has not gone far enough to begin to weaken the analysis.

We do not have to adopt Price's colorful language to see his basic point. The methods of science demand the possibility of detailed, impersonal (mechanistic) explanations. Parapsychology denies the universal applicability of this kind of explanation, insisting on the irreducible efficacy of some kind of person-environment interaction not mediated by muscles, eyes, etc., hence some kind of agency available to persons but not to physical systems. Therefore, parapsychology is incompatible with the whole course and direction of modern science. Furthermore (here we are going beyond Price, but in a direction we think consistent with his reasoning³), science aims in principle at a complete explanation of

³ Price did not present the line of reasoning presented here, perhaps because it is too overtly metaphysical. Instead, he used a very weak inductive argument to show that parapsychology is not only counterscientific, but also thereby invalid:

Experience is all we have available as a guide to the future. As Reichenbach has pointed out, even when we consider magic phenomena, we must still base our expectations on inductive reasoning from past experience. From our experience we have derived certain generalizations concerning observable phenomena. (Some of these we term *laws of science*, while others are so fundamental that we rarely name them.) In addition, we are able to make other generalizations concerning these first generalizations, for an enormous amount of data has accumulated. . . . We cannot prove that psi phenomena do not occur. Maybe in the presence of a "sensitive" the basic limiting principles no longer limit. But all our experience suggests that it will be more profitable for us to assume that the old generalizations are still valid, and that the findings of the parapsychologists are to be explained on the old, familiar basis of human error. (Price, 1955, p. 361)

Although Price was converted from belief in ESP by Hume, he was evidently

the world, or of any and all its parts. Our confidence in rational thought and experimental investigation is founded on the conviction that these are adequate for the understanding of nature. Not only the practice of science, but the very possibility of a scientific understanding of the world therefore demands impersonal explanations and precludes disembodied intelligences. If we were to accept the validity of the claims of parapsychologists, we would in effect accept that the world is not altogether an ordered causal sequence, that the methods of science cannot be applied successfully to all its parts, and that our confidence in reason and evidence (the combination of which is distilled in scientific method) is misplaced. Parapsychology therefore constitutes an attack, not merely on present scientific theories, but on the conviction of the accessibility of the world to human reason, and thereby on the potential of reason and science themselves.

Therefore the claims of parapsychologists must be wrong and their successful experiments must be due to fraud.

All these conclusions, except possibly the last one, are, we submit, entirely cogent. The last may not be cogent but is at least very understandable. Parapsychology does undermine the conviction of the rationality of the world in precisely this way. It is for this reason that it is unacceptable. Furthermore, the threat it affords must be a real one. In the second half of this century, the pages of *Science* have not been open to attacks on Christianity, witchcraft, or the Delphic oracle. All of these make or have made claims that are incompatible with science, but have not required refutation in *Science*.

But there is still much that is problematic. *Why* must parapsychology be incompatible with the thrust of modern science? *Why* is that incompatibility so great that parapsychology threatens the conviction of the rationality of the universe itself? *Why* must

unwilling to follow his master, and the major thrust of the philosophy of science in this century, in recognizing the frailty of inductive reasoning. Nevertheless, reliance on the regular order of nature as precluding the paranormal, in the way outlined here, is implicit in many of his statements:

To make a silent wish—and mysteriously influence the fall of dice. To sit with closed eyes while knowledge of the future strangely floats into the mind. These possibilities have for us the charm of childhood days. . . . But the way of science is different. To construct a building, each brick and board must be fitted into place by human beings—not by jinn who answer the rubbing of a lamp. If our soldering is careless, our circuit will certainly be noisy; and if we make our seals poorly, our vacuum system will assuredly leak—and no incantation will help. (Price, 1955, p. 362)

mechanistic explanations be built into the groundwork of scientific method, to the extent that a methodical search for the "laws of psi," as Mundle (1971) describes in reply to Price, does nothing to rehabilitate the field? The answers to these questions take us far from parapsychology and its vicissitudes. They must be considered here because the incompatibility of parapsychology with modern science is neither accidental nor recent, but is built into the assumptive base of modern science itself. It is because the aims and claims of parapsychology clash so strongly with this assumptive base that the field attracts such hostility. It is for the same reason that, if accepted, parapsychology would have the revolutionary implications on which Rhine and some other parapsychologists frequently insist.⁴ To understand fully the unacceptability and the importance of parapsychology to modern science, we must examine the sources for scientific method and for the confidence it has inspired. It is to these that we now turn.

THE NATURAL SCIENCES AND THE POWER OF REASON

The sources of the confidence in rationality in Western culture can be found in the Protestant reformation and in the seventeenth-century scientific revolution, although it took until the late eighteenth century for these to issue in anything recognizable as a cultural norm of rationality. While the Protestant reformation had a number of conflicting influences, one of the most important according to several writers was to produce an increasing suspicion of magic in all its forms, of the presence of the supernatural in everyday life. As Stephen (1902/1927, p. 79) put it, Protestantism, in opposing ecclesiastical authority over the tenets of faith, was "unintentionally acting as a screen for rationalism." Protestant writers would eventually, by the start of the eighteenth century, begin to question the reality of biblical miracles, and certainly to have little patience with nonbiblical ones.

⁴ For example (one of many), in Rhine's (1956) reply to Price:

[Price], even more than any other critical reviewer, gives indication of having felt the force of the evidence for ESP. When he turns then—albeit a bit too emotionally—and says that, according to the current concept of nature, ESP is impossible and therefore the parapsychologists must all be fakers, he at least draws the issue where it can be squarely met. The answer of the parapsychologist is: "Yes, either the present mechanistic theory of man is wrong—that is, fundamentally incomplete—or, of course, the parapsychologists are all utterly mistaken." One of these opponents is wrong; take it, now, from the pages of *Science*! This recognition of the issue gives point to the findings of parapsychology in a way none can easily miss. (Rhine, 1956, p. 11)

But if the Protestant reformation set the stage for the distrust of magic or any other nonnatural forces in life, a much more subtle and positive basis for confidence in the rationality and order of the universe emerged from the scientific revolution in a way that could be attractive in Protestant and Catholic countries equally. The assumptions which underlay this confidence are embedded in the very start of the scientific revolution. They appeared as part of the effort to carve out a proper domain for the natural sciences. More specifically, they served the purpose of justifying the restriction of scientists' attention to those features of the world which could be studied at that time with scientific rigor, while simultaneously permitting the claim that the whole of the physical world was open to scientific scrutiny. The fundamental assumption, a metaphysical or epistemological one, is what may be called the reification of mathematics. This is the conviction that the physical world (which very gradually came to mean the whole world) could be completely understood, but only through the application of mathematics to it. As Galileo wrote:

Philosophy is written in this grand book—I mean the universe—which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering about in a dark labyrinth. (Galilei, 1623/1960, pp. 183–184)

The assumption has its own roots in the revival of a Pythagorean kind of mathematical mysticism during the Renaissance, but Galileo, Descartes, and others easily separated it from that background (Koyré, 1943a, 1943b).

An immediate corollary of this assumption, bringing the abstract metaphysics and epistemology down to the more concrete level of theory and methodology, is the distinction between primary and secondary qualities. This distinction was given its first modern formulation by Galileo in 1623 (Galilei, 1623/1960); it asserts that some perceived qualities or properties are genuinely inherent in objects and others are not. In the more familiar statement by Locke (1690/1959) in *An Essay Concerning Human Understanding*, the claim is that "primary" qualities such as solidity, shape, and numerosity genuinely pertain to objects, but that "secondary" qualities such as color, odor, and pitch do not. They owe their existence, says Locke, solely to the "power" of physical bodies to make us perceive them.

It is Galileo, however, and not Locke, who made the distinction between primary and secondary qualities influential, even though his name is not so typically associated with it. The reason is that Galileo's formulation of the distinction played an important part in his founding of the science of dynamics, and hence by extension of all modern physics. The distinction provided Galileo with justification for concentrating upon accelerations, rates of fall, trajectories, etc., by providing a conceptual basis from which it followed automatically that these were the most important and enduring properties of objects. His statements will repay a closer look.

Galileo's formulation of the distinction between primary and secondary qualities can be broken down into three components. The first is the claim that only the primary qualities such as hardness, size, and motion are properties of the objects themselves. Secondary qualities such as color and heat are, properly speaking, only in the perceiver. They are, says Galileo, "no more than mere names . . . they have their habitation only in the sensorium. Thus, if the living creature were removed, all these qualities would be removed and annihilated" (Galilei, 1623/1960, p. 309). The second is the claim that despite their radically different status, primary and secondary qualities are given equally in perception. There is nothing in our perceptions themselves to tell us which qualities are primary and which secondary. To put it another way, there is no way in which the distinction between primary and secondary qualities can be made purely phenomenally, within perception. Speaking of the secondary qualities, Galileo says that "since we have imposed upon them particular names which differ from the names of those other previous real attributes, we wish to believe that they should also be truly and really different from the latter" (Galilei, 1623/1960, p. 309). The "names" and "beliefs" which we apply to the secondary qualities are not themselves sensory acts of course, but the senses must be accounted responsible for them nonetheless. The reason is that "without the senses to guide us, reason or imagination alone would perhaps never arrive at such qualities" (Galilei, 1623/1960, p. 309). The third is a suggestion, at least, that our perceptions of both primary and secondary qualities are purely passive results of the action of the real primary qualities of material things on our sensory receptors. The primary qualities "excite in us" and "make us perceive" the secondary qualities:

I do not believe that for exciting in us tastes, odors, and sounds there are required in external bodies anything but sizes, shapes, numbers, and slow or fast movements; and I think that if ears, tongues, and

noses were taken away, shapes and numbers and motions would remain but not odors or tastes or sounds. These, I believe, are nothing but names, apart from the living animal—just as tickling and titillation are nothing but names when armpits and the skin around the nose are absent. (Galilei, 1623/1960, p. 311)

If the perception of secondary qualities is a passive process, and if they cannot be differentiated from primary qualities merely by sensory means, how is Galileo in fact able to make the distinction? Galileo does not give us very much help in finding out. The only justification which he gives for making the distinction is as follows:

I say that upon conceiving of a material or corporeal substance, I immediately feel the need to conceive simultaneously that it is bounded and has this or that shape; that it is in this place or that at any given time; that it moves or stays still; that it does or does not touch another body; and that it is one, few, or many. I cannot separate it from these conditions by any stretch of my imagination. But that it must be white or red, bitter or sweet, noisy or silent, of sweet or foul odor, my mind feels no compulsion to understand as necessary accompaniments. (Galilei, 1623/1960, p. 309)

This is not in itself very convincing. Some ninety years later, Berkeley in *An Essay Towards a New Theory of Vision* would reply that he could not conceive of a body without any color either; some color was as necessary to his conception of a body as some shape (Berkeley, 1709/1910, p. 72; sect. 130).

The difference between Galileo and Berkeley was not just a difference between what they were individually unable to conceive of. Berkeley's inability to conceive of a body without any color was based on his conviction that material objects exist only insofar as they are actual or potential objects of perception. Galileo's inability to conceive of a body without any shape was based on his conviction that material objects have physical reality only as an expression of the mathematical or geometric order of the universe. The distinction, that is, could be propounded only from the view of the mathematical idealism which Galileo and most of his fellow scientists shared to a greater or lesser extent, but which Berkeley did not. The reification of mathematics, the conviction of the mathematical order of the universe, simultaneously supported and was supported by the distinction between primary and secondary qualities.

It should be clear why the distinction between primary and secondary qualities is a necessary consequence of a commitment to the kind of mathematical models of explanation that were possible

at the time. If the world could be fully understood through mathematics, then something had to be done with those apparent aspects of the world which could not be given a mathematical treatment. What was done with them was to declare that they were not parts of the world, that they "have their habitation," as Galileo put it, "only in the sensorium." Hence the primary qualities of objects, which really existed in the world, were all those which could be described mathematically. The secondary qualities, which existed only in the mind, were all those which could not.

Galileo's formulation of the distinction between primary and secondary qualities may seem esoteric, but it had immense scientific significance. It enabled Galileo and succeeding scientists to sever at a stroke the epistemological knots which had for centuries seemed to make empirical knowledge unreliable. Perception had always seemed so vague, inconsistent, and dependent upon extraneous factors that it could not be trusted as the source of information about objective reality. Galileo himself, in arguing with his more consistently empirical Aristotelian opponents who assumed that all perceived qualities had equal (although limited) validity, liked "to parade with all possible vigour the common facts of sense illusion, and for every fact that told against the trustworthiness of the senses he had many which tended to establish the validity of his mathematical solutions" (Burt, 1932, p. 69). The distinction between primary and secondary qualities identified, or seemed to identify, the source within perception of these perceptual inconstancies. Perceptions of heat, smell, color, etc., could not be trusted as sources of information about the world because, as such, they did not correspond to anything in the world. Perceptions of size, shape, motion, etc., could be trusted, if sufficient care in measurement were taken, because these qualities were in the world. As a result, as long as scientific attention was restricted to the primary qualities of objects—which were necessarily the measurable ones—scientists could safely assume that the resulting perceptual information was both *objective*, in that it was free of the distortions introduced by the human senses, and *veridical*, reflecting the way the world really was.

The positive effects of the distinction, in short, lay primarily in the way that it made empirical knowledge possible. In some earlier philosophical schools, the phrase "empirical knowledge" had sometimes seemed almost a contradiction in terms; in others it at best referred to a relatively poor, provisional, and uncertain kind of knowledge. It is because the distinction which Galileo introduced worked that the two terms thereafter went together much more

readily. The distinction was thus a vitally important one, needed to underpin the significance of scientific investigations, and was accordingly adopted and refined by Descartes, Boyle, Newton, Locke, and others. This distinction, along with the conviction of the mathematical intelligibility of the universe which gave rise to it, thus provided much of both the theoretical and methodological basis for the scientific revolution. It was introduced for methodological reasons, but had considerable theoretical import in its own right.

In summary then, the secondary qualities, and by extension any other aspects of life or experience that could not be assimilated to a mathematico-physical view of nature, came more and more to be considered as separate and apart from the physical world. They lacked physical reality and had, at most, a real status only in the mind. In this way both the methodological and the theoretical basis of the scientific revolution required an a priori conception of the world as a self-contained mathematico-physical system, in which irreducibly mental qualities had a physically indescribable position, tolerable only if they were confined within individual organisms. This a priori conception was a condition of the intelligibility of nature. If it were overthrown, the confidence in the power of science to understand the universe would be badly shaken. But there was no reason to expect that it would be overthrown. The physical sciences, advancing in line with these assumptions, went from triumph to triumph, becoming a model of the power of human reason. The model was strong enough to give these assumptions a wide currency in intellectual and scientific circles and, by the time of the eighteenth-century Enlightenment, to give an abbreviated form of them currency as part of educated common sense.

PROBLEMS FOR THE "NONNATURAL" SCIENCES

However, if this a priori scheme was helpful for the development of physics, it posed serious dilemmas for philosophy, psychology, and eventually parapsychology.

Philosophically, the whole conception was incoherent; it was incompatible with its own beneficial results. The distinction between primary and secondary qualities afforded a new and firmer status to empirical knowledge, as we have seen. However, that distinction could not be justified along any empirical lines. Instead, any consistent empirical analysis, such as Berkeley's (1710/1910)

was bound to reject it. An idea, as he said (meaning a sensory experience), can resemble nothing but another idea (Berkeley, 1710/1910, p. 116; sect. 8). That is, we cannot by recourse to our experience justify the claim that some experiences (those of the primary qualities) resemble the nonexperiential reality of things while others (those of the secondary qualities) do not. In consequence, the status of scientific theories, concerned only with the former, is rendered problematic; how is the limitation of their subject matter, and its identification with all of physical reality, to be justified? The problems are neatly summarized by Thayer (1968), and have provided much of the subject of unresolved philosophical debate for three centuries.

For psychology the problems were even greater and more closely tied to the contents of the *a priori* conception of the world. That conception legislated a new definition of mind as the repository of all those bits of the experienced world that could not be given a mathematical analysis—color, pitch, odor, etc. The nature of experience, as mental *by virtue* of being excluded from the physical world, thus became the defining characteristic of mind. The basis for the distinction between mind and body was thereby recast. In both Platonic and Aristotelian philosophy (and their continuation in medieval thought) the distinction between mind and body was primarily a functional one; the intellect was distinguished from the animal functions by the higher nature of its activity, which required contact with a suprasensible reality to account for it. In the post-Galilean empiricist model the distinction is made on the basis of the irreducible nature of the elements; sensations as mental bits are defined as different from and excluded from the world of matter (cf. Matson, 1966).

The problem was that this revised conception of mind was one that was rather difficult to make an object of scientific study. It originated, after all, in the attribution to the mind of just those qualities that were not amenable to mathematical scientific analysis. As one historian of science has commented:

It does seem like strange perversity in these Newtonian scientists to further their own conquest of external nature by loading on mind everything refractory to exact mathematical handling and thus rendering the latter still more difficult to study mathematically than it had been before. Did it never cross their minds that sooner or later people would appear who craved verifiable knowledge about mind in the same way they craved it about physical events, and who might reasonably curse their elder scientific brethren for buying easier success in their own scientific enterprise by throwing extra handicaps in the way of

their successors in social science? Apparently not; mind was to them a convenient receptacle for the refuse, the chips and whittlings of science, rather than a possible object of scientific knowledge. (Burt, 1932, pp. 318-319)

The basis for the composition of the mind, in short, was such that the mind thus defined was not readily susceptible to scientific explanation. In addition, the mutually exclusive nature of the distinction between mind and body seemed to rule out any possibility of an integrated theory of mental and physical. However, what the dualistic scheme did make possible was an encroachment of physical explanations on the activities, if not the nature, of the mind. The mind, after all, depends, however mysteriously, on the brain. Physiological theories of brain function could thus eventually threaten to account for all the functions of mind—behavior, the products of rational thought, etc.—leaving only its defined essence, conscious experience, untouched. The rapid development of neurophysiology in the nineteenth century made such an outcome seem increasingly likely, and thereby made epiphenomenalism an increasingly attractive theory of the mind-brain relationship for many writers (Note 1). The problem of the relationship between physiological and autonomously mentalistic explanations is still by no means resolved in modern psychology, and with the revival of interest in introspection (e.g., Lieberman, 1979) and the stream of consciousness (e.g., Pope & Singer, 1978), may again become acute. The scientific metaphysics of the seventeenth-century scientific revolution cast a long shadow.

That shadow, however, is longest and sharpest in parapsychology. It is in this field that the a priori conception of the world outlined above had its most immediate implications; they were to render the paranormal impossible and rationally almost inconceivable. Paranormal phenomena are a priori impossible and intellectually unacceptable because they violate the a priori assumptions that are necessary to guarantee the intelligibility of nature. Mental and other nonmathematico-physical entities and forces were tolerable in the scientific scheme, as we have noted, only if they were confined within the nonphysical minds of individual organisms, where they could not interfere with the orderly course of nature. Paranormal phenomena, on the other hand, depend on the causal efficacy of some kind of mental or otherwise irreducibly nonmathematico-physical influences extending outside the physical boundaries of individuals. Whatever the nature of these influences, they are such as to force a break in the universality of the con-

ception of the world as an ordered causal sequence. It is thus irrelevant whether these irreducible and causally efficacious elements exist in some way separate from individuals (as in some interpretations of Mesmer's universal fluid) or wholly within individuals but with causal efficacy extending beyond the person's body independent of physical processes (as in many interpretations of telepathy). In either case, things that do not belong in nature are doing something in nature.

As with the mind, the paranormal was established as a category on a new basis as an outcome of the scientific revolution. For mind, the basis or defining characteristic shifted from intellectual activity to sensation. For the paranormal, the basis shifted from an unclear combination of separateness from the kinds of activities characteristic of daily life and contact with supramundane agencies to an explicit exclusion from the range of possibilities allowed to nature. In each case the set of events or activities which could be included under the revised conception differed only slightly from the earlier set, but the change in the definition affected the emphasis that could be accorded them. In the case of mind, most obviously, the priority given to sensation increased the stakes involved in attributing sensations to other organisms. For Cartesian philosophers, determined to retain the special status of human beings, it was therefore necessary to deny sensations to animals. In Aristotelian philosophy, where perception is a function of the animal soul, no such restriction was necessary. In the case of the paranormal, the emphasis on the incompatibility with the ordered sequence of the physical world rendered some extreme psychological phenomena no longer paranormal, as long as they remained merely psychological. Poetic inspiration and epilepsy (the "divine madness"), for instance, were sometimes considered in Greek thought to result from the influence of a supramundane reality as much as prophetic dreams did; but in the revised conception they lost that status, being confined to the internal workings of the mind, and were not physically anomalous, even if they remained intrinsically inexplicable.

Paranormal phenomena are not therefore an independently specifiable class of events which just happen to conflict with scientific conceptions of the world. Instead, they were established as paranormal by the genesis of that scientific conception, and are not definable separately from it. They stand, therefore, as a direct challenge, or at least an affront, not primarily to particular scientific theories (which are constantly changing), but to the common foundation of scientific theories, scientific method, and the en-

lightened commonsense view of the intelligibility of nature. It is the system which is threatened, rather than just the establishment.

THE ENLIGHTENMENT AND THE BEGINNING OF THE
PARAPSYCHOLOGICAL TRADITION

It takes time for the implications of a radical new conception to be realized. It takes more time for them to filter through to popular culture, even of the most highly educated variety. While awareness of Italian astronomical discoveries was fairly widespread in early seventeenth-century England, for example, those discoveries were by no means taken to herald a new view of the universe as a mathematically ordered system of matter in motion. They were seen to have cosmological significance to be sure, but more by casting doubt on the old order than by introducing the new (Nicolson, 1971). Nicolson cites Donne's famous lines written in 1611, which express these doubts poignantly:

And new Philosophie calls all in doubt,
The Element of Fire is quite put out;
The Sun is lost, and th'earth, and no mans wit
Can well direct him where to looke for it. (Quoted in Nicolson, 1971, p. 23)

Donne was expressing his disquietude over the dissolution of the hierarchically ordered medieval world view; and well he might, as the "new Philosophie" and Protestant theology were jointly consigning it to oblivion (Mason, 1971; cf. Stephen, 1902/1927). It was not until well into the eighteenth century that the theistic Newtonian world view, of the universe as a vast orderly machine designed and constantly overseen by a watchful Creator, became widely enough accepted to provide some of the security previously lost.

The paranormal, too, took time to be assimilated to—or rather rejected from—the new cosmology. Throughout the seventeenth century and well into the eighteenth, witches, magicians, Rosicrucians, alchemists, and others practiced their trades with a fine disregard for the "new Philosophie" whose foundations they were contravening. The scientists and rational intellectuals of the later seventeenth century absorbed the implications of the new view quickly enough, but the witches and their public were slower to catch on.

The distance between high culture and popular culture in the midst of the scientific revolution is nicely illustrated by the case of Joseph Glanvill. Glanvill was a respected minor English scientist

and secretary of the Royal Society in the 1660s and 1670s. As a skeptic he wrote influential tracts on the necessity for empirical verification of any supposed truths, rather than taking anything on faith. These tracts anticipated, and to some extent may have influenced, later British empiricist philosophy. Glanvill, however, also believed in witchcraft, on the basis of what he considered sufficient evidence, and wrote at length defending his belief (e.g., Glanvill, 1681/1966). He was scorned by his contemporary intellectuals for holding to such an outmoded superstition, and has had something of a reputation for gullibility, or at least anachronistic beliefs, ever since. The point is that at this time the persecution, trial, and (in some localities) execution of witches was still at its peak in Britain and Europe. Glanvill was old-fashioned in comparison with the advanced, rational stream of scientific culture, but not at all in comparison with the beliefs and actions of the rest of his society. That he was old-fashioned rather than ahead of his time in anticipating the reaction to the mechanistic cosmos is shown by his motives for taking witches seriously. Those motives were mainly theological, concerned with refuting atheism, rather than either scientific or antiscientific, concerned with putting back into the universe what the new philosophers had left out.

It was rather as part of the enthroning of reason in the middle-to-late eighteenth-century period known as the Enlightenment that the conviction of the rational order of nature came to be more widely appreciated as precluding the possibility of magic, witchcraft, etc. Hume and Paine, quoted as authorities by Price for their derogation of the paranormal, were major exponents of the spirit of the Enlightenment. In basing their reasoning on the laws of nature, with the presumption that these were fully accessible to human experience and intellect, they gave clear expression to that rational, confident spirit (although Hume, in his epistemological writings, did much to undermine it). The wider reception of the spirit of scientific rationalism in the Enlightenment did not of course deter people from involvement with the paranormal. But for some of them at least (witchcraft and magic have never entirely died out) it put that involvement on a new footing of explicit opposition to the tenets of the scientific conception of the world. Pursuit of the paranormal in its modern form thus began as part of the multifaceted reaction against the rational scientific world picture of the Enlightenment.⁵

⁵ This is so despite the fact that mesmerism, the first significant movement in the

It may be noted in advance that it was never the *foundations* of scientific method and theory, as expressed in Galileo's methodological analysis and later philosophical advances upon it, that were explicitly opposed by exponents of the paranormal. Rather, it was the apparent *implications* of physical scientific theories, of a mechanistic cosmos wherein science would "unweave the rainbow" and denigrate the soul of man, that was opposed. The distinction is subtle but important, for two reasons.

First, the mechanistic implications of scientific theories took some time to be realized and opposed. There were good reasons for this delay apart from that of cultural lag. Cartesian physical theory was overtly mechanistic, but was mathematically less precise than Newtonian theory, which from the end of the seventeenth century became generally preferred in scientific quarters. Newtonian theory was not explicitly mechanistic, however. The constant action of God was invoked both explicitly, to rectify anomalies in some of the planetary orbits, and implicitly, as the analogue and ground of the universal Euclidean space across which action at a distance was propagated (Burt, 1932). It was more than a century after the publication of Newton's *Principia* in 1684 that La Place was able to show that all planetary orbits could be accounted for by a slight extension of Newton's theory, so that the explicit appeal to God was unnecessary. The implicit appeal thereby also lost much of its attractiveness; besides, the objectionableness of "action at a distance" had by then become dulled by time. The Newtonian cosmos in the hands of La Place thus first took on the status of an explicitly clockwork universe, governed wholly by immutable, physical laws, one that could permit La Place's celebrated reply when Napoleon asked the place of God in his system: "Sir, I have no need of that hypothesis."

Second, the foundations of the scientific picture of the world were buried in history and could be disputed at will. As we have noted, Berkeley showed the incoherence of the distinction between primary and secondary qualities as early as 1710, and while the distinction tended to be uncritically accepted in scientific circles for

modern tradition of involvement with the paranormal, started out in Mesmer's own activities as a triumph of naturalistic Enlightenment attitudes over traditional theological views (Ellenberger, 1970, ch. 2). But the triumph did not last. As Ellenberger points out (1970, p. 53), "Mesmer's theories were rejected, the organization he had founded was short-lived, and his therapeutic techniques were modified by his disciples." As a result, the movement went underground and, with Puysegur, came rapidly to focus on the "higher phenomena."

long after, it was never seen as essential in order to maintain the credibility of the scientific enterprise. The ongoing success of that enterprise was sufficient for the purpose. The mechanistic implications of scientific theories, by contrast, were constantly renewed and stressed by scientific systematists and popularizers from La Place (1814/1902) to Monod (1972). They thereby provided an ongoing spur to opposition by those who objected to having the spirit of man read out of the universe.

This second point also suggests, however, that the conceptual foundations of the scientific revolution retained logical priority over the presumed mechanistic implications of specific scientific theories. Those scientific systematists from La Place to Monod have tended to draw much the same implications from their diverse theories—that the universe is a lawful and mathematically ordered system of matter in motion. These implications are not the same or equivalent because of the common subject matter of the various theories from which they are drawn; these range from physics to physiology to psychology. Rather, they are similar because they are instantiations of the common guiding assumptions of modern science in general (see Greene, 1959, for the force of these guiding assumptions in the development of biology, and Dijksterhuis, 1961, for their role in physics and cosmology).

There are many exceptions to this picture of incipient mechanism guiding the development of scientific theory—indeed, parapsychology is one of them—but they are not anomalous. The exceptions include Goethe on color, Oken, Driesch and others on vitalism, the *Naturphilosophie* movement generally, and others. None of them just happen to be antimechanistic, any more than mainstream scientific theories just happen to be mechanistic. They are all founded on explicit opposition to the mechanism of the mainstream line of scientific development.

Continuous involvement with the paranormal in opposition to the tenets or implications of the scientific world picture dates, for the reasons given, mainly from the late eighteenth century.⁶ The reaction against the theoretical implications of Enlightenment science—the soulless mechanical theory of nature—produced the romantic movements in science such as *Naturphilosophie*, and also produced the movements of mesmerism and spiritualism that comprise the beginning of what we propose to call the parapsychologi-

⁶ A survey of the development of the different movements within the parapsychological tradition is beyond the scope of this paper. Such a survey, organized within the framework presented here, is in preparation.

cal tradition. The parapsychological tradition is a tradition of explicit opposition to the rationalistic and implicitly or explicitly materialistic scientific views of the scientific revolution and Enlightenment, views which in their general import easily survived the romantic reaction and came increasingly to dominate nineteenth-century science. The parapsychological tradition has embodied a direct and continuing reaction against the exclusion of uniquely mental or otherwise physically irreducible qualities from the "real" world, expressly including, in one way or another, the physical world.⁷ It is a tradition of trying to prove or demonstrate that there are forces, entities, phenomena in the universe other than those which orthodox scientists would allow—forces such as irreducible capabilities of the human mind, or of spiritual fields extending throughout the cosmos, such as could never be contained in any purely materialistic theory. It is this spirit of self-conscious opposition to the mechanistic implications of the physical sciences that most clearly marks the parapsychological tradition; it justifies dating the tradition only from the Enlightenment, separates the tradition from other kinds of concern with ghosts, witches, and prophecy, and (see below) distinguishes the tradition from the dominant response of religion and philosophy to the challenge of scientific advance. Equally, it is the tendency in this tradition to focus on readily observable phenomena and to base the opposition to materialism on public and frequently vulgar demonstrations, that distinguishes the parapsychological tradition from the mystical inclinations of the *Naturphilosophie* and many other components of the romantic reaction. There are many differences in focus, methodology, and immediate aim between mesmerism, later variants of animal magnetism, spiritualism, early psychical research, and modern experimental and quasi-experimental parapsychology. Nevertheless, they all share the one defining characteristic of the parapsychological tradition, in that they all involve attempts to demonstrate more or less publicly the existence and causal efficacy of some kind of irreducible nonmathematico-physical elements in the world.

⁷ It is not meant by this that a major aim in the parapsychological tradition has been to integrate physical and nonphysical factors in a unified account of the world. Such an aim has been relatively uncommon, although not altogether lacking from the tradition. Rather, the aim has been to show that there is at least some autonomy in the nonphysical factors, that they are not totally dependent upon the physical ones, and that there is therefore some kind of genuine interaction between the two.

CONTRAST BETWEEN THE PARAPSYCHOLOGICAL AND
THEOLOGICAL TRADITIONS

The contrast between the parapsychological tradition and theology in their relationships with the natural sciences throws the rational unacceptability of the former into sharper perspective. Both have found themselves in conflict with the tenets or presumed implications of scientific theories, but the means available to them for dealing with the conflicts have been very different.

The possibility of conflict between scientific and religious orientations took some time to be taken seriously. Galileo's trial by the inquisition in 1633 was an exceptional case. Even in this case, however, Cardinal (now Saint) Robert Bellarmine, who supervised an earlier hearing on Galileo's heliocentric theory in 1619, clearly set out the line eventually to be taken by the church:

If there were a real proof that the Sun is in the centre of the universe, that the Earth is in the third sphere, and that the Sun does not go round the Earth but the Earth round the Sun, then we should have to proceed with great circumspection in explaining passages of Scripture which appear to teach the contrary, and we should rather have to say that we did not understand them than declare an opinion to be false which is proved to be true. (Quoted in Koestler, 1968, pp. 454-455)

For the most part, however, scientists were regarded tolerantly and even enthusiastically as working out the details of God's handiwork, with little risk of confrontation with the central elements of Christian dogma. It seemed a safe enough bet. Newton's physics, as we have noted, was strongly theistic. Biology from the time of Newton's contemporary, John Ray, onward was at least equally so; its main emphasis was on the adaptation of organisms to their environments, which was consistently interpreted as evidence of "design" or divine planning. It was not until the late eighteenth century in physics, and the nineteenth century in the biological and earth sciences, that the possibility of serious incompatibility between scientific and religious views became widely recognized. Gradually, the religious tradition defused the prospects of confrontation with the scientific one by seeking an accommodation with it, making formulations of its subject matter that as far as possible did not conflict or overlap with scientific views. The practice of proceeding "with great circumspection in explaining passages of Scripture" became widespread, even if never universal.

However, the theological response was not only or even mainly one of dignified retreat. From the late seventeenth century until the middle of the nineteenth, the data of science were invoked with

mounting enthusiasm to provide a naturalistic basis for religion. The argument from design was the main vehicle, but in the hands of such scientists as Newton and Boyle in physics, Ray in biology, Lyell in geology, Bell in physiology, Whewell in astronomy, and many others, as well as of theologians from Cudworth to Paley, the argument took more the form of a celebration. Every aspect of nature gave mute testimony to the wisdom and benevolence of the Creator in designing a universe so complex and well fitted together and, often, so well suited for the habitation of man (for a brief review see Carré, 1967). While the argument from design is very old, its "golden age," as Carré (1967, p. 300) points out, "was the two centuries following the rise of science in the seventeenth century." The use of science as a basis for natural theology was not a superficial accommodation by either scientists or theologians, but was indicative of a genuine shared commitment to the theistic interpretation of what Boyle first dubbed the mechanical philosophy.

Much of the theological response to the rise of modern science consisted, therefore, of two separate strategies. First was the gradual retreat from specific statements of fact, expressed in the Bible or maintained in orthodox theology, where these conflicted with scientific views. The circling of the sun around the earth was one of these, as was the creation of the world in seven days. Scriptural statements on such matters were to be interpreted analogically. Second, and far more extensive, was a shift in theological priorities that enabled theology to join with many branches of science in a common demonstration of at least some tenets of religious belief. The revolutionary theological implications of evolutionary theory were not a consequence simply of its bringing more of nature into the province of science, but rather of its eventually successful challenge to the argument from design. Evolutionary theory thus undermined the cooperative relationship between science and theology and gradually forced the latter to employ more and more of the first strategy, a retreat from statements of fact, in its accommodation to science.

The parapsychological tradition, by contrast, had neither of these strategies available to it. Founded directly on an opposition to the foundations and continuing implications of the natural sciences, it could neither retreat to safe ground where conflict could be minimized, nor affirm part of its message in cooperation with the sciences. Unlike the aims and content of the religious and theological traditions, those of the parapsychological tradition could not be expressed independently of the central concerns of

science. The parapsychological tradition was restricted instead to expressions of its dominant concerns which, while certainly varied, were united in their essential contradiction of the central claims of science. There have of course been instances of persons involved with the parapsychological tradition who adopted a nonempirical form of occultism or a nonconfrontational variety of spiritualism as a religion (see below for examples). But for the most part, the parapsychological tradition is unique in its substantial acceptance of many of the tenets of the scientific world-picture, combined with an insistence that it must be supplemented and reinterpreted by the inclusion of nonmathematico-physical factors. The parapsychological tradition, that is, has typically claimed to operate in the same universe of discourse as the natural sciences do. It has for this reason tended usually to emphasize publicly observable evidence—not necessarily of a scientific or scientifically acceptable sort, but public nonetheless—in support of its various positions, with an increasing commitment to empirical and quasi-scientific methodology throughout its development. The antimechanistic parapsychological tradition is thus the metaphysical complement of the mechanistic scientific one. The incompatibility of its theoretical orientation with that of the natural sciences is as basic as the incompatibility of mind and matter—not surprisingly, as they have the same source. The continuing opposition to the orthodox sciences by those involved in the parapsychological tradition has thus seemed as irrational to exponents of the natural sciences as the continuing opposition to parapsychology by natural scientists has seemed irrational to parapsychologists. The mutual incomprehension, furthermore, has intensified as one or both traditions progressed. Especially with the rapid advance of explicitly materialistic biology and physiology in the nineteenth century, the parapsychological tradition's continuous opposition to the scientific world-picture seemed gratuitous and offensive to many.⁸

⁸ There are problems in understanding the nineteenth-century developments, however. The time of greatest scientific consolidation and achievement was also the time when more scientists than ever before took an active interest in spiritualism. In many cases this involvement long preceded the revolutionary turn-of-the-century discoveries in physics that Asimov (1975) proposes as the basis for some scientists' interest in the paranormal. The success of evolutionary theory, with its destructive consequences for the comfortable relationship between science and religion, undoubtedly played a large part in stimulating a search by some scientists for a "rational substitute" for religion. However, the uses of parapsychological material by scientists in the nineteenth century show apparent inconsistencies. William

Furthermore, the positive content of the movements within the parapsychological tradition often impinged sharply on the domain of religion. This tendency was most obvious in spiritualism and early psychical research, with their focus on mediumistic phenomena and contact with the world beyond the grave, but it sometimes surfaced in mesmeric circles as well. Accordingly, the parapsychological tradition often excited theological as well as scientific repugnance. While the scientific reply to mesmerism and spiritualism emphasized fraud, delusion, suggestibility, mass hallucination, and occasionally undiscovered natural forces (e.g., Marvin, 1874), the theological reply added to these the agency of the devil (e.g., Munger, 1857).

Thus, the parapsychological tradition has regularly been committed to ongoing opposition to one of the strongest Western cultural traditions, that of science. It has lacked any effective means of accommodation whereby the confrontation could be defused. It has not had a previously established and independent basis for cultural support. It has often seemed to be poaching on the preserve of the other strongest Western cultural tradition, that of religion. It is quite natural that it has seemed, and continues to seem, intolerable and unacceptable to many persons committed to either of the two dominant traditions of reason and faith. Under the circumstances, it is not surprising that parapsychology and its forerunners have frequently received harsh and apparently unfair treatment at the hands of hostile critics. What may seem more surprising is that, with this background, it should ever have received any sympathetic hearing at all.

That it has received such a hearing at various times attests to a long-running current of dissatisfaction with some aspects of the scientific world-picture and partial agreement on some of its limitations. It is also true, however, that much of the interest shown in movements in the parapsychological tradition over the past two

Carpenter, for instance, was a bitter opponent and critic of both mesmerism and spiritualism (e.g., Carpenter, 1853, 1877). Yet he used the phenomena of somnambulism, automatism, etc., produced by mesmerists as one of the main bases for his revolutionary neural reflex theory of brain functioning (Carpenter, 1855). William James, on the other hand, was strongly and sympathetically interested in psychical research, both when it was still focused mainly on spiritualism and after. Yet he never incorporated any of the results of psychical research in any major way into his psychological or philosophical theories, despite their strong *prima facie* relevance to his theoretical interests and goals.

centuries has not been based on the unique features of that tradition, but rather on attempts to assimilate those movements to religious or occult orientations. The writings of Andrew Jackson Davis typify the first tendency, the career of Theosophy, the second. While Davis's writings were reputedly inspired, they did not purport to be a public demonstration of the reality of the spirits. Instead, they were attempts to systematize spiritualist insights into a cohesive body of belief, and Davis more than once vainly lamented "the preoccupation of spiritualists with the facts of psychic phenomena to the exclusion of their moral and philosophical implications" (Brown, 1973, p. 193). Theosophy, while it started as an offshoot of spiritualism, consistently emphasized occult knowledge derived from esoteric Buddhism and other sources (Fodor, 1934/1966, pp. 31-33). Both insisted on the central importance of illumination rather than demonstration, and thus minimized their commitment to public demonstrations of phenomena incompatible with materialism which we, along with the mass both of spiritualists and of scientists attracted to psychical research at the time, see as fundamental to the parapsychological tradition.

CONCLUSION: IMPLICATIONS FOR MODERN PARAPSYCHOLOGY

The analysis sketched in the preceding pages has implications that go beyond a historical explanation of the intellectual hostility that parapsychology has sometimes encountered. In this concluding section we will discuss two of these.

Basic Limiting Principles and the Criterion of the Paranormal

We have stressed the complementary relationship between the parapsychological and natural science traditions, and the mutually exclusive nature of their domains. This mutual exclusiveness, we have suggested, is comparable to the mutual exclusiveness of mind and matter, in that both are the consequence of an implicit definition of the allowable characteristics of the physical world. The difference between the two cases is mainly that the "mental" was established as such by being allocated to a distinct preserve, while the "paranormal" was established as such by being ruled out of nature altogether. It follows that an ostensibly paranormal event can continue to be regarded as paranormal only so long as it does *not* meet Price's criterion of acceptability discussed above, to wit that a detailed mechanistic explanation can be proposed for it. If

such an explanation is available, the event may be scientifically acceptable, but it will not be paranormal. The recent history of parapsychology offers some examples to illustrate this point. Pratt's (1953) research on the homing behavior of pigeons and migratory birds was suitable for publication in the *Journal of Parapsychology* only because no "normal" explanation of their behavior seemed possible. When it became established that birds use astronomical information for navigation, i.e., the position of the sun and stars, their behavior ceased to be a subject for parapsychology, even though the details of how the birds integrated the complex astronomical data remained unclear. It is accepted, however, that the feat is accomplished by some kind of internal processing of information acquired by normal sensory means, and is thus a problem for comparative psychology. For a more recent example, Kirlian photography seems set to vanish from the concerns of parapsychologists now that a physico-chemical explanation for it has been offered (Pehek, Kyler & Faust, 1976). If that explanation is satisfactory, the removal of Kirlian photography from the ranks of parapsychological problems will be complete, however much information it provides about mood, personality, etc. It will, instead, be a topic for physiological psychology, whether any physiological psychologists choose actively to investigate it or not. The point can be made more formally. Any explanation of an ostensible paranormal phenomenon that successfully relates it either to physico-chemical mechanisms or to a known form of sensory-motor interaction with the world thereby removes it from the field of parapsychology. Kirlian photography provides an example of the first case, homing behavior of the second.⁹

The appropriateness of this negative criterion for the paranormal goes part way, at least, to helping us pin down the meaning

⁹ It does not follow, as Boring (1966) claimed, that the case for the paranormal is wholly negative, resting only on phenomena that have not yet been accounted for, and that any successful explanation is therefore a loss for parapsychology. Boring's comment does in fact apply to the cases of successful explanation that are at hand, such as the two just mentioned. However, it is the kind of explanation that matters. An explanation that related paranormal phenomena to something other than sensory-motor or physico-chemical agencies would be a signal success for parapsychology, and is the explicit goal of most theories of psi. Such theories, however, have not been very successful in permitting control over paranormal phenomena. They therefore do not suffice to refute Boring's claim in themselves, and an analysis of the relation of the paranormal to the "normal" sciences, such as is presented here, is necessary in order to establish the limitations of his claim.

of the paranormal. The most influential characterization of the paranormal is that of Broad (e.g., 1949/1978). He wrote:

There are certain limiting principles which we unhesitatingly take for granted as the framework within which all our practical activities and our scientific theories are confined. Some of these seem to be self-evident. Others are so overwhelmingly supported by all the empirical facts which fall within the range of ordinary experience and the scientific elaborations of it (including under this heading orthodox psychology) that it hardly enters our heads to question them. Let us call these *Basic Limiting Principles*. Now psychical research is concerned with alleged events which seem *prima facie* to conflict with one or more of these principles. Let us call any event which seems *prima facie* to do this an *Ostensibly Paranormal Event*. (Broad, 1949/1978, p. 43)

These basic limiting principles (BLPs) place restrictions on the ways in which we can obtain knowledge about or act upon the world.¹⁰ We can obtain knowledge about another person's state of mind only by sensory means modified by inferences; we can have only inferential knowledge of the future; we can affect the physical world only through our muscles and nerves; and mental events can occur only in conjunction with brain events. Broad gives a much fuller exposition of BLPs than this (Broad, 1949/1978, pp. 45-49), but the fuller list is compatible with this brief one.

While the definition of a paranormal event as one that violates one or more of these BLPs seems both intuitively and descriptively appropriate, it has its limitations. Braude (1978) complains that Broad's list suffers from a "pernicious lack of generality or abstractness. Broad has failed to explain what, in general, a phenomenon must conflict with in order to conflict with a *BLP*" (Braude, 1978, p. 234). It is certainly true that Broad gave examples of BLPs, rather than a definition of them, so that we are given no explanation of "what makes these principles examples of *BLPs*" (Braude, 1978, p. 235). As a result, as Braude points out, it is not clear how universally accepted they must be to count as BLPs, or for contradictions of them to be considered paranormal. Parapsychologists, at least, often reject some of these BLPs, but do not feel that their research is on something other than the paranormal as a result.

Braude's requirement of a more systematic account of the BLPs is a reasonable one and can be met. We suggest that the

¹⁰It may be noted that Broad's concept of Basic Limiting Principles agrees quite well with Price's (quoted in Footnote 3).

origin of Broad's BLPs is to be found in the conceptual foundations of the scientific revolution as outlined previously. The mathematico-physical order imposed upon the world and the restriction of physically unassimilable events and processes to the non-interacting minds of individuals clearly implies at least the first three BLPs listed. The fourth, the dependence of mind on brain, is compatible with that initial imposition of order, and became an inevitable consequence of it as that order was unambiguously extended to include the nervous system. Broad's basic limiting principles, therefore, do not occur in isolation. They are among the implications of the *a priori* conception of the world as a mathematically ordered system of matter in motion that was the founding basis for modern science. The BLPs are therefore specifiable independently of current consensus about them. That is, they are not to be defined simply as what the majority of scientists or people in general currently happen to believe, although an implicit scientific consensus on views at least compatible with them is of course necessary for them to retain any force.

We are thus proposing an interpretation of BLPs which Braude briefly considered attributing to Broad, but at once rejected:

Broad might have been making an historical claim about idea-acquisition. He might have been maintaining that the acceptance by a person or by society of scientific theory follows the acceptance of the *BLPs*. But this, of course, is transparently false, since the *BLPs* are by no means universally held, even among those who accept current scientific theory. (Braude, 1978, p. 236)

This interpretation is not "transparently false," for three reasons. First, it is not claimed that acceptance of the BLPs preceded the acceptance of *any* scientific theory by *any* society, but rather that their acceptance preceded (or rather was the basis for) the acceptance of the particular scientific tradition that grew out of the seventeenth-century scientific revolution, initially by western European societies and, later, by diffusion and transplantation (with some concurrent cultural dislocation) by others. The Western scientific tradition has some degree of cultural specificity, and alternatives to it may well be possible. Second, for the BLPs to serve as the pretheoretical basis for scientific theories, it is not necessary that they be held by every member of a society, but rather that views compatible with them (and which can therefore constitute instantiations of them) be held generally by the scientific community. The continuing force of the BLPs is thus compatible with their being rejected by some laymen, or even by some scientists

when they step outside the community framework of their own discipline. Third, when people who consider themselves scientists reject any of the BLPs, or any of the other implications of the scientific conceptual framework from which they stem, they almost invariably do so quite deliberately as part of their commitment to the study of the paranormal or to the modification generally of the mechanistic tendencies of modern science. The rejection of the BLPs "even among those who accept current scientific theory" is therefore not adventitious, but is part of a questioning of at least some parts of such theory.

For these reasons we consider Braude's rejection of a historical basis for the BLPs to be mistaken, although we agree with him that it was not Broad's intention to propose one. The historical analysis of their basis, we submit, does more than any other to account for their force, their interrelationships, and the resistance to them by a small body of scientific and prescientific writers.

Normal Science and the Increasing Acceptability of Parapsychology

If one were to suggest to a modern experimental psychologist that his activities were constrained by the conceptual foundations of science laid down in the seventeenth century, his response would quite likely be one of incomprehension and irritation. If he were historically sophisticated, the incomprehension might be absent, but not the irritation. He could reply that the ancient philosophical background to his discipline no more concerned him than alchemy concerned chemists or astrology concerned astronomers. The philosophical foundations of scientific disciplines are always a quagmire, and the proper activity of a scientist is to do research on the forward edge of his field rather than to dig around in the marsh.

Such a reply would be understandable and to a considerable extent justifiable. However, it could have been made more safely thirty years ago than now. Then, experimental psychology was much more behavioristically oriented than now, and conscious experience and mental events were treated, when they were treated at all, as hypothetical constructs rather than as the primary data and subject matter of psychology. With the recurrence of interest in introspection, the stream of consciousness, etc., in mainstream psychology, as previously noted, there is at least a danger that the problem of "how to locate the experiential element in a materialistic world view" (Natsoulas, 1974) will again arise to haunt psychology.

That question, as we have seen, is central to psychology's legacy from the scientific revolution. But the vast majority of experimental psychologists are not specifically concerned with the stream of consciousness, and may reasonably feel that such questions do not affect them, at least for the time being.

The loss of interest in such "philosophical" questions in experimental psychology was not simply a consequence of the behaviorist revolution. It was also in part one of the fruits of the professionalization of the field early in this century. As entry to psychology became more dependent on the gateway of graduate school and the research apprenticeship it provides, and as the results of research came to be published mainly in specialized journals read by like-minded specialists, increasing attention came to be paid to the cumulative minutiae of particular research projects. The "big" questions of the relationship of consciousness to the brain, etc., remained in the background, but were not the main priority for the younger, specially trained entrants to the discipline. They had better things to do with their time.

The same kind of professionalization has been taking place in parapsychology for many years, and with it, an increase in the professional acceptability of the discipline. Largely as a result of the success of Rhine's *Extra-sensory Perception* (1934/1973), the field came increasingly to be dominated by apparently rigorous, behaviorist-style methodology throughout the 1930s and 1940s. *The Journal of Parapsychology* was established as an explicitly professional journal in 1937, and the *Journal of the ASPR* became one in the 1940s. The first university chair in parapsychology was established at Utrecht in 1953. The Parapsychological Association, with membership restricted to those who had made a professional contribution to the field, was founded in 1957. These early moves toward methodological and institutional professionalization have continued and begun to bear fruit. Parapsychology is becoming reasonably well established as a respectable, although still a low-prestige, science. The Parapsychological Association since 1969 has been in the company of other scientific societies as an associate of the American Association for the Advancement of Science (AAAS). Professorial chairs in parapsychology have been established in a few universities throughout the world, and opportunities for both undergraduate and postgraduate training exist at many more. State grants for parapsychological research are still uncommon, but are not unknown. Isolatable research problems are reasonably well defined in the field, providing access to a cumulative and technical "puzzle-

solving" or "normal science" research tradition. As a result, parapsychology is now coming to attract recruits through the ordinary scientific gateway of graduate schools. This pattern of recruitment contrasts sharply with that which existed before the field was accepted into university curricula, when commitment to parapsychology carried a much greater cost in lost career opportunities. As a result, contemporary recruits may well lack the philosophical commitment that was more necessary for entry into the field before the ordinary gateways opened up; such commitment, at least, is no longer necessary to provoke an individual's decision to enter the field. Consequently, as such new recruits gradually become entrenched in the field and come to constitute the parapsychological establishment, they may be expected tacitly to drop the theme of opposition to other sciences and, confident in their scientific credentials, act only as good specialists should. To a considerable extent, this change appears to have occurred already, and many of the younger workers in the field seem uninterested in the philosophical dilemmas that exercised their elders. If this process of professional insularization continues and accelerates, then parapsychology may remain difficult to reconcile with some interpretations of physics, but no more *overtly* so than psychology. While some interpreters of parapsychology continue at present to insist that parapsychological findings, once accepted, will require a fundamental revision of physical and biological theory, such an insistence may come to be more and more of a fringe activity. In confident anticipation of these trends continuing, some experimental parapsychologists might reasonably feel, with their colleagues in experimental psychology, that the history of their discipline has no direct relevance to them.

However, they would be wrong, for two sets of reasons. The first is introduced by J. A. Wheeler in a brief paper entitled "Drive the Pseudos out of the Workshop of Science," accompanied by a letter he wrote to the board of directors of the AAAS in February 1979 suggesting that that body consider revoking the membership of the Parapsychological Association (in Gardner, 1979). Wheeler appeared particularly provoked by the observational theories of psi, which impinge on his own field of quantum physics. He is not alone in opposing parapsychology, however. The intellectual hostility to the field with which we began this paper continues to be widespread (see, for instance, the series of articles "The Psychics Debunked" in *The Humanist* for May/June 1977). The point is basically that even if parapsychologists choose to bury the hatchet

and bask in their increasing scientific respectability, their critics are unlikely to cooperate.

But there is more to it than that, because that increasing scientific respectability may not be so solidly established as parapsychologists like to think. It may instead prove to be ephemeral. The much-heralded admission of the Parapsychological Association to the AAAS, for instance, was not based simply on a spontaneous consensus that parapsychology had proved itself to be genuinely scientific. Instead, as Schmeidler (1979) recalls, the critical influence was the strong advocacy by Margaret Mead, who was in turn personally impressed and influenced by Gardner Murphy. On a more modest level, Price (1972) withdrew the criticisms contained in his 1955 *Science* article, apparently because he had become convinced through correspondence of the personal integrity of J. B. Rhine. Actions based on personal influence, however, may be undone by other actions based on personal influence, as Wheeler may be able to demonstrate.

More generally, as several writers have pointed out (e.g., Freedland, 1972; Moore, 1977), the burgeoning popular interest in parapsychology in the 1960s and early 1970s occurred as part of a spreading counterculture. Experimental parapsychology was on the right wing of a loose congerie of movements that included astrology, ufology, est, scientology, and various forms of occultism and mysticism. As Moore observes:

In that decade an amazing range of people found it possible to explore witchcraft (black and white), telepathy, Zen, astrology, and alchemy (all while smoking dope) with no sense of having opened an oddly mixed bag of things. In the minds of some people Zener cards took on the same magical significance as Tarot cards. (Moore, 1977, p. 222)

Many parapsychologists abhorred these links with occultism of course (e.g., Dingwall, 1971; McConnell, 1973), and few if any endorsed them, but the field appeared to benefit from them. The spread of parapsychology courses in universities in the 1960s was prompted by student demand, and the students doing the demanding often appeared to be the same ones who were the most enthusiastic about the Age of Aquarius. This is an impressionistic statement of course, but it receives some support from statistics on the relative numbers of parapsychological vs. explicitly occult books on sale at a university bookstore in 1969 (McConnell, 1971, p. 94). Parapsychology books were outnumbered by more than thirty to one.

To the extent, however great it is, that the institutional accept-

ance of parapsychology is dependent on its perceived links with occultism, that acceptance may decline as occultism in general declines in popularity. Occult revivals come in waves; those of the late nineteenth and late twentieth centuries are charted by Webb (1974) and Freedland (1972), respectively. If the latest one continues to decline to a low base level, parapsychologists may find that they, too, suffer from loss of interest on the part of students. Such a loss of interest could quickly lead to a decline in university positions, research funding, and of course postgraduate students—in short, many of the social necessities for a scientific discipline. Many parapsychologists might welcome a decline in occultism, with which they feel their discipline has been unfairly linked, as a necessary step towards cleansing the temple of science. Their problem, however, will be to stay on the inside of the temple.

For these reasons, we doubt that it will be easy for parapsychology, even of the most rigorously experimental sort, simply to drop its theme of opposition to other sciences and become fully established as just one more experimental discipline. The historical opposition between the parapsychological and the natural science traditions is a mutual one, for the reasons outlined previously. The historical analysis of the intellectual sources of hostility to parapsychology accounts, not only for why critics have been hostile, but also for why they are likely to remain so. These considerations comprise the first part of the answer to the question of what relevance the historical background of parapsychology has for modern parapsychologists.

The second part of the answer has to do with parapsychology rather than with its critics. Even if modern researchers are not driven by the motive of disproving mechanism, materialism, etc., the objects of their study are still phenomena barred from the universe by the assumptions and implications of the natural sciences. It is only this feature that ties together the wide variety of topics investigated by parapsychologists and distinguishes them from those of psychology, physics, etc. Parapsychology is thus still definable as the study of phenomena that cannot be assimilated to a mathematico-physical conception of the world—roughly, of phenomena that cannot be given a reductive explanation but that interfere in some way with those that otherwise can. Phenomena that can be thus assimilated are excluded from the field. Pratt's homing pigeons were lost to parapsychology when a psychological explanation for their behavior became credible, whether Pratt wanted to see them go or not. If the observational theories of psi

were to succeed in unambiguously relating paranormal phenomena to quantum physics, those phenomena would retain their place in parapsychology only so long as the theories required the irreducible personalistic status (the consciousness, in short) of a human or animal observer. Otherwise, paranormal phenomena in general would go the way of the homing pigeon, incorporated into an expanded and triumphant mechanism. If the successful observational theories did require the irreducible consciousness of the observer, then they would indeed constitute a signal success for parapsychology and, conversely, a defeat for orthodox quantum physics.¹¹ The success of the one, however, would depend on the defeat of the other.

In short, the paranormal, as historically constituted, is all that parapsychology has got; and that historical constitution is such as to identify the paranormal with what cannot exist in the physical world. As a result, if parapsychology should become more generally successful in publicly demonstrating and controlling some of these "impossible" phenomena, the achievement would have considerable repercussions throughout science and beyond.¹² It could

¹¹ Wheeler's "Drive the Pseudos Out . . ." was prepared as an appendix to his AAAS conference paper, "Not Consciousness but the Distinction Between the Probe and the Probed as Central to the Elemental Quantum Act of Observation" (Gardner, 1979).

¹² We might seem to be begging some questions here. Many parapsychologists would insist that repeated successful demonstrations, by any reasonable criterion, have been made; Martin (1979) cites the long series of successful experiments with Pavel Stepanek as a prime example. Does not scientific indifference to those experiments show that the orthodox sciences can avoid the revolutionary implications of parapsychology indefinitely, simply by refusing to look at the evidence? And would not the *a priori* basis for scientific denial of the paranormal, as outlined in this paper, lead one to expect orthodox scientists to react in just this way? Would it not, that is, make it almost impossible for any demonstration to be accepted as successful? The answer to all these questions is: yes, but there are limits, even if they cannot be precisely specified. Although the *a priori* world view served as the initial basis for confidence in scientific methods, that confidence is now more directly based on the ongoing successes of the sciences themselves, as we observed earlier. Quite apart from their origins, the methods of science are objects of confidence in themselves. The world view which supports them is still influential, but not, we think, omnipotent. Methodologically tight enough and impressive enough demonstrations of the paranormal can be imagined, even if not provided, that would challenge it. The experiments with Stepanek certainly appear to provide cogent evidence for ESP *if* one rules out the possibilities of systematic fraud, biased selection of data, insufficient experimental controls, etc. Otherwise, they do not. One can imagine experimental arrangements to which these criticisms would not be applicable, however. They would stress public observation (not in principle but in fact) and simplicity. Public levitations, to take a fanciful example, might help.

be expected to lead to drastic revisions to current scientific theories and methods, whether individual parapsychologists were specifically interested in pressing the case for such revisions or not.

The second part of the answer, then, is that parapsychology remains tied to its historically conditioned adversary relationship with the natural sciences. Without that, it has no continuing basis for identity. Achievements in the field, therefore, are important just to the extent that they are incompatible with, and as a result have revolutionary implications for, the modern scientific world picture. For these reasons, we feel that the old-fashioned ideologues in the field, such as J. B. Rhine and J. G. Pratt, had a more accurate conception of parapsychology's significance than some of the less philosophical newcomers.

But the two facets of parapsychology's status are inseparable. To the extent that an undeniable demonstration or successful theoretical interpretation of the paranormal would have revolutionary implications, to that same extent will parapsychology remain scientifically unacceptable and its findings be scientifically repudiated. Until (or unless) this nexus can be broken by an achievement in the field considerably more compelling than any made up until now, parapsychologists should not expect any more lasting acceptance from their critics than they have received so far.

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Dept. of Psychology
University of Tasmania
Hobart, Tasmania 7001
Australia